Contains No CBI

(1)

UNION CARBIDE

UNION CARBIDE CORPORATION 39 OLD RIDGEBURY ROAD, DANBURY, CT 06817-0001 / 9

8EHQ-92-12251

8820016470

September 29, 1992

(A)

INIT

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Document Processing Center (TS-790)
Room L-100
Office of Toxic Substances
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Attn: Section 8(e) Coordinator (CAP Agreement)

Re: CAP Agreement Identification No. 8ECAP-0110

Dear Sir or Madam:

Union Carbide Corporation ("Union Carbide") herewith submits the following report pursuant to the terms of the TSCA §8(e) Compliance Audit Program and Union Carbide's CAP Agreement dated August 14, 1991 (8ECAP-0110). This report describes a human respiratory irritation study with maleic anhydride (CASRN 108-31-6).

"Maleic Anhydride Respiratory Injuries", Carbide & Carbon Chemicals Corp. (UCC), Medical Division Report, November 13, 1949.

A complete summary of this report is attached.

Previous TSCA Section 8(e) or "FYI" Submission(s) related to this substance are:

(None)

Previous PMN submissions related to this substance are: (None)

malanh

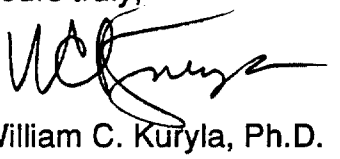
RECEIVED 8-19-94

(2)

This information is submitted in light of EPA's current guidance. Union Carbide does not necessarily agree that this information reasonably supports the conclusion that the subject chemical presents a substantial risk of injury to health or the environment.

In the attached report the term "CONFIDENTIAL" may appear. This precautionary statement was for internal use at the time of issuance of the report. Confidentiality is hereby waived for purposes of the needs of the Agency in assessing health and safety information. The Agency is advised, however, that the publication rights to the contained information are the property of Union Carbide.

Yours truly,



William C. Kuryla, Ph.D.
Associate Director
Product Safety
(203/794-5230)

WCK/cr
Attachment (3 copies of cover letter, summary, and report)

malanh

SUMMARY

(3)

Carbide & Carbon Chemicals Corp.
Institute, W. Va.
November 13, 1949

Medical Division Report
"Maleic Anhydride
Respiratory Injuries"

Summary and Conclusions

1. Maleic anhydride vapor, even in mild concentrations, is capable of causing hayfever-like symptoms of the eyes and upper respiratory tract. Symptoms are photophobia, excessive tear secretion, and pain in orbits from air touching the eyeball. Findings are those of a conjunctivitis and blepharitis and swelling of the lids.

2. Higher concentrations of maleic anhydride vapor is capable of producing an asthma-like attack in individuals exposed to these vapors. Symptoms are those of bronchial asthma with coughing, wheezing and constriction of the chest. Respiratory findings are those of an acute attack of bronchial asthma.

3. More than a week is necessary for this asthma-like condition to subside to normal physiological findings.

4. Oxygen inhalation is not a specific treatment for this condition but seems to relieve the symptoms for several hours following the inhalations and definitely makes the patient feel that he is improving. Other medications used for the treatment of asthma, as aminophyllin, adrenalin, ephredrine, etc., and also antihistamines, were not used in these cases.

5. Canister-type gas masks seem to keep the irritating vapors of maleic anhydride out of the inspired air, at least for a time, but are uncomfortable and definitely annoying to the employee when worn continuously for periods of several hours.

CONFIDENTIAL

Carbide & Carbon Chemicals Corporation
Institute, West Virginia

Medical Division Report
November 13, 1949

Maleic Anhydride Respiratory Injuries

Medical literature contains no information regarding injuries due to maleic anhydride. The "Manual of Hazards to Health from Chemicals Used at the Plants and Laboratories of Carbide and Carbon Chemicals Corporation" lists maleic anhydride as capable of being a Grade 4 hazard, which means that a major residual injury may result in spite of prompt treatment. Research and production men at South Charleston and Institute plants, who have had previous experience with this chemical, agree that it is very irritating to the lungs and respiratory apparatus.

Maleic anhydride at ordinary temperatures is a water-white, clear, colorless, and crystalline solid. Its freezing point is 52.6°C. The vapor pressure of this chemical at 20°C is very low, less than 0.1 mm. However, this material is capable of sublimation, from solid to vapor, without a liquid phase. A very small amount of the solid or liquid will soon contaminate a room with very irritating vapors. A very small amount of vapor can be extremely irritating, especially to the mucous membranes of the eyes and respiratory apparatus. At the present time, liquid maleic anhydride is being drummed in a small room on the first floor of the west end of the Catalyst Warehouse building. The men performing this work are continuously exposed to the vapors of maleic anhydride. The liquid maleic anhydride stored in tanks in the Maleic Anhydride Unit is pumped through a 1½" line to the Catalyst Warehouse. When the drum-filling procedure is being carried out, the liquid maleic anhydride enters the drum through a 1½" nozzle. The drums are cold and the material relatively hot (60°C), and as the initial portion of the liquid maleic anhydride flows into the drum, a small cloud of vapor arises into the air through the opening of the drum. The reason this vapor cloud forms is not definitely known, but evidently has something to do with the temperature of the drum. The drum being filled lies on its side, and immediately above the bung, which is on the side of the drum, is a vacuum air stream which circulates through an air washer. Some of the vapor arising from the bung is not trapped in this air stream and consequently contaminates the small room where this drum-filling procedure is carried out. This vapor, of course, is very irritating, and during the course of the drum-filling the vapor concentration may go higher and higher as the number of drums being filled are increasing. At the end of several hours the maleic anhydride vapor concentration is much higher than can be normally tolerated by workers not wearing respiratory protection.

This report covers our experience on respiratory injuries due to maleic anhydride. Two men, who filled 84 drums during one continuous period of 8 hours, 7:30 p.m. to 3:30 a.m., received respiratory injuries which resulted in asthma-like chest findings. Since these two cases were seen, several other men on succeeding shifts filled 21 drums and 17 drums, respectively. These men were called into the dispensary for examinations by the plant physician and they did not exhibit any manifestations or have any symptoms relative to a maleic anhydride exposure, except mild conjunctivitis and blepharitis, which is to be expected from very low concentrations.

Two fitters were also subjected to relatively high concentrations of maleic anhydride vapors. These exposures were due to vapors escaping from spills resulting from maintenance work being performed on the maleic anhydride molding machine. These men had similar asthma-like chest findings but were much less severe. These fitters came to the dispensary voluntarily for examination because of their annoying symptoms.

Case Histories

I. M. R. McCallister, PR #991-007, a white, male, age 42, was drumming maleic anhydride on Sunday, November 6, from 7:30 p.m. to 3:30 a.m. the following morning. During this time he wore a gas mask with an organic vapor and acid gas type canister which is recommended for one hour's service. He did not wear vapor proof goggles as eye protection. At 3:30 a.m. he complained to the shift superintendent, Mr. G. M. Rader, that his eyes burned. At that time Mr. Rader irrigated McCallister's eyes with saline solution and instilled sterile mineral oil. Mr. McCallister left the plant and slept for a few hours at home.

He returned to his regular work in the Shipping Department the same morning at 8:00 a.m. At 9:30 a.m. he visited the plant dispensary, complaining of burning eyes, wheezing and coughing. At this time the duty nurse irrigated his eyes for a period of ten minutes and found that on staining with fluorescin, each eye took a faint greenish stain on the cornea. She referred McCallister to the plant physician because of his chest complaints.

McCallister stated that in addition to his eyes burning that he had started coughing and wheezing while he had been drumming. After arriving home he noticed constriction of his chest and had coryza with the symptoms of a hayfever-like attack of his eyes and upper respiratory tract. His conjunctiva were reddened, his eyelids evidenced blepharitis with reddening and edema. The mucous membranes of his nose and throat were mildly reddened and he had a thin profuse watery discharge from his nose. On further examination, this individual also presented the typical symptoms of an asthma-like attack of his lower respiratory tract. On auscultation he presented sibilant and sonorous rales all over his chest in all lobes on expiration only. On inspiration the breath sounds were clear and physiological. He further stated that a doctor who had examined him in 1938 had told him that he had a "touch of asthma" at that time. At this first examination the patient had a blood pressure of 118/70, a pulse count of 92 per minute, and a urine specimen was normal. He was sent to the Herbert J. Thomas Memorial Hospital on this date, November 7, 1949, for a CBC, a urinalysis, and a chest X-ray. The CBC was normal except for an elevation of his WBC of 16,000 with 70% segmented neutrophils. His urinalysis was normal. The chest X-ray reading was as follows: "Chest reveals a great number of small discrete calcified tubercles throughout both lung fields. This appearance is generally ascribed as a healed aspergillus infection. The appearance is essentially normal otherwise." Upon his return to work, Mr. McCallister was started on oxygen inhalations under positive pressure for intervals of one-half hour each, B.I.D.

On November 8, 1949, McCallister was still coughing and wheezing and complaining of mild intermittent constriction of his chest anteriorly. Examination of the chest by auscultation revealed sibilant and sonorous rales over all the chest on inspiration and expiration. Oxygen therapy was continued as before.

On November 9, 1949, he still had rales but not as pronounced as on the previous examinations. He was sent to the South Charleston Clinical Laboratory for a CBC, which was reported as normal except for a WBC of 12,650 and segmented neutrophide count of 63%. At this time his eosinophile count was 4.

McCallister continued to improve and received oxygen inhalations daily until November 14, when he was discharged as cured. No rales were heard at this time but he still had mild coughing attacks occasionally. A total of 8 days from time of exposure was required for breath sounds to be considered physiological in this case. No additional laboratory work was performed.

II. J. W. Harrah, PR #991-021, a white, male, age 33, was assisting McCallister on November 6 and 7, drumming maleic anhydride. He wore no respiratory protection, but did wear rubber splash goggles that were not vapor proof. His job consisted of placing empty drums under the fill pipe and righting and wheeling the filled drums out of the room. He also screwed the caps of the drums into the bungs. At 3:30 a.m., November 7, he also had his eyes irrigated by the shift superintendent, after which he went to his home. This man was on evening shift at the time and was not seen the following evening, November 7, as he did not come to the dispensary voluntarily. He was seen on November 8, 3:15 p.m., after having been requested by the duty nurse to come to the dispensary for examination. His eyes were negative to fluorescin staining and he did not present hayfever-like symptoms of his upper respiratory tract, except for a mild coryza which he mistook for a common cold. He was complaining, however, of wheezing and occasional coughing episodes. Auscultation of his chest revealed sibilant and sonorous rales over all the chest on inspiration and expiration. He denied any previous attacks of asthma, hayfever or other allergic manifestations. He was started on oxygen inhalations under positive pressure for 30 minutes daily. On November 9, 1949, a stereoscopic X-ray of his chest was reported as: "There is no pathology visualized in the heart or lungs." A CBC was essentially negative with a WBC of 8,500 and a neutrophil count of 71. A urinalysis was negative.

This man was examined daily and evidenced rales until November 14, when his breath sounds were clear and essentially physiological. He was discharged as cured. Mild coughing occasionally was still occurring.

III. T. H. Waugh, PR #695-027, a pipefitter, was working on the second floor of the Catalyst Warehouse building and was exposed to the vapors of maleic anhydride over a period of three weeks while working on the molding machine. On November 9 the vapor was excessive, as a spill occurred while repairing a line. On November 10, he requested to be examined because of coughing and wheezing. Examination revealed nothing remarkable except sibilant rales of his lower lobes only at the height of inspiration. He was started on Mercodol cough syrup, 1 teaspoonful every 3 hours, and oxygen inhalations for 30 minutes, B.I.D.

On November 11, auscultation of his chest revealed squeaking, bubbling rales in all lobes at the height of inspiration. A chest X-ray performed at this time revealed no pathology and a CBC was essentially normal, with a WBC of 9,700 and a segmented neutrophil count of 58%. This man was examined and received oxygen therapy daily. During this 11-day period the squeaky, musical rales heard at the height of inspiration persisted and gradually faded out by November 21, when his breath sounds became physiological. He was discharged as cured on that date.

IV. E. A. Short, PR #691-161, a pipefitter working with Waugh was seen in the dispensary on November 9, complaining of coughing and wheezing. He had faint sibilant rales over all his chest on expiration only. He was started on oxygen inhalations, B.I.D. No laboratory work was performed on this patient and he was discharged on November 21 as cured since his chest was negative. He still complained of mild coughing attacks intermittently.

V. W. L. Rose, PR #991-013, a Shipping Department employee working regularly on the maleic anhydride molding machine, was called in for an examination which was essentially negative. He stated that he regularly wore a gas mask when the maleic anhydride vapors started to irritate his eyes, nose and throat.

VI. F. H. Rogers, PR #991-020, a Shipping Department employee, had been working on November 7, setting up drums and capping the full drums of maleic anhydride. Seventeen drums were filled by this man and the man he was assisting (Case VII). Examination of this man was negative, but he was complaining of photophobia and an excessive secretion of tears. Since eye staining was negative, he was issued dark glasses and given no other treatment. Rogers had been wearing a canister gas mask while working at this job.

VII. E. C. Nichols, PR #991-011, a Shipping Department employee, had been filling 17 drums of maleic anhydride on November 7. Examination was negative. Nichols also wore a canister type gas mask during the drumming operations.

No time was lost from work by any of these men.

Summary and Conclusions

1. Maleic anhydride vapor, even in mild concentrations, is capable of causing hayfever-like symptoms of the eyes and upper respiratory tract. Symptoms are photophobia, excessive tear secretion, and pain in orbits from air touching the eyeball. Findings are those of a conjunctivitis and blepharitis and swelling of the lids.

2. Higher concentrations of maleic anhydride vapor is capable of producing an asthma-like attack in individuals exposed to these vapors. Symptoms are those of bronchial asthma with coughing, wheezing and constriction of the chest. Respiratory findings are those of an acute attack of bronchial asthma.

3. More than a week is necessary for this asthma-like condition to subside to normal physiological findings.

4. Oxygen inhalation is not a specific treatment for this condition but seems to relieve the symptoms for several hours following the inhalations and definitely makes the patient feel that he is improving. Other medications used for the treatment of asthma, as aminophyllin, adrenalin, ephredrine, etc., and also antihistamines, were not used in these cases.

5. Canister-type gas masks seem to keep the irritating vapors of maleic anhydride out of the inspired air, at least for a time, but are uncomfortable and definitely annoying to the employee when worn continuously for periods of several hours.

Recommendations

1. Improve ventilation of the rooms on the first and second floors of the Catalyst Warehouse building where maleic anhydride is handled, so that it is not necessary for employees working in these locations to wear gas masks.

2. Perhaps pre-heating of the steel drums before filling might stop the excessive formation of maleic anhydride vapor when the initial portion of the liquid enters the cold, empty drum. The present vacuum system might then be capable of exhausting the vapor arising from the bung of the drum.

3. Men working in these rooms should be cautioned not to overexpose themselves to maleic anhydride vapor concentrations in that they are definitely irritating. They should be advised also that they should report to the dispensary for examination if any unusual, abnormal symptoms of their eyes, lungs, or skin appear.

R. J. Sexton, M.D.
Plant Physician

RJS:mf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MAR 0 6 1995

EPA acknowledges the receipt of information submitted by your organization under Section 8(e) of the Toxic Substances Control Act (TSCA). For your reference, copies of the first page(s) of your submission(s) are enclosed and display the TSCA §8(e) Document Control Number (e.g., 8EHQ-00-0000) assigned by EPA to your submission(s). Please cite the assigned 8(e) number when submitting follow-up or supplemental information and **refer to the reverse side of this page for "EPA Information Requests"** .

All TSCA 8(e) submissions are placed in the public files unless confidentiality is claimed according to the procedures outlined in Part X of EPA's TSCA §8(e) policy statement (43 FR 11110, March 16, 1978). Confidential submissions received pursuant to the TSCA §8(e) Compliance Audit Program (CAP) should already contain information supporting confidentiality claims. This information is required and should be submitted if not done so previously. To substantiate claims, submit responses to the questions in the enclosure "Support Information for Confidentiality Claims". This same enclosure is used to support confidentiality claims for non-CAP submissions.

Please address any further correspondence with the Agency related to this TSCA 8(e) submission to:

Document Processing Center (7407)
Attn: TSCA Section 8(e) Coordinator
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
Washington, D.C. 20460-0001

EPA looks forward to continued cooperation with your organization in its ongoing efforts to evaluate and manage potential risks posed by chemicals to health and the environment.

Sincerely,

Terry R. O'Bryan

Terry R. O'Bryan
Risk Analysis Branch

Enclosure 12251A

Triage of 8(e) Submissions

Date sent to triage: MAY 0 5 1995

NON-CAP (CAP)

Submission number: 12251A

TSCA Inventory: (Y) N D

Study type (circle appropriate):

Group 1 - Dick Clements (1 copy total)

ECO AQUATO

Group 2 - Ernie Falke (1 copy total)

ATOX SBTOX SEN w/NEUR

Group 3 - Elizabeth Margosches (1 copy each)

STOX CTOX (EPI) RTOX GTOX

STOX/ONCO CTOX/ONCO IMMUNO CYTO NEUR

Other (FATE, EXPO, MET, etc.): _____

Notes:

THIS IS THE ORIGINAL 8(e) SUBMISSION; PLEASE REFILE AFTER TRIAGE DATABASE ENTRY

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entire document: (0) 1 2 **pages** 1,2 **pages** 1-3

Notes:

Contractor reviewer : LPS **Date:** 12/30/94

CECATS\TRIAGE TRACKING DBASE ENTRY FORM

CECATS DATA:
Submission # 8EHQ- 1092 - 12251 SEQ. A

TYPE: (INT.) SUPP FLWP

SUBMITTER NAME: Union Carbide Corporation

SUB. DATE: 09/29/92 OTS DATE: 10/07/92 CSRAD DATE: 08/19/94

INFORMATION REQUESTED: FLWP DATE:
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)

DISPOSITION:
(0639) REFER TO CHEMICAL SCREENING
(0678) CAP NOTICE

VOLUNTARY ACTIONS:
(0401) NO ACTION REPORTED
0402 STUDIES PLANNED/UNDERWAY
0403 NOTIFICATION OF WORKERS/OTHERS
0404 LABEL/MSDS CHANGES
0405 PROCESS/HANDLING CHANGES
0406 APP./USE DISCONTINUED
0407 PRODUCTION DISCONTINUED
0408 CONFIDENTIAL

CHEMICAL NAME:

CAS#
108-31-6

INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C
0201	ONCO (HUMAN)	01 02 04	0216	EPI/CLIN	01 02 04	0241	IMMUNO (ANIMAL)	01 02 04
0202	ONCO (ANIMAL)	01 02 04	0217	HUMAN EXPOS (PROD CONTAM)	01 02 04	0242	IMMUNO (HUMAN)	01 02 04
0203	CELL TRANS (IN VITRO)	01 02 04	(0218)	HUMAN EXPOS (ACCIDENTAL)	01 02 04	(0243)	CHEM/PHYS PROP	01 02 04
0204	MUTA (IN VITRO)	01 02 04	0219	HUMAN EXPOS (MONITORING)	01 02 04	0244	CLASTO (IN VITRO)	01 02 04
0205	MUTA (IN VIVO)	01 02 04	0220	ECO/AQUA TOX	01 02 04	0245	CLASTO (ANIMAL)	01 02 04
0206	REPRO/TERATO (HUMAN)	01 02 04	0221	ENV. OCCC/REL/FATE	01 02 04	0246	CLASTO (HUMAN)	01 02 04
0207	REPRO/TERATO (ANIMAL)	01 02 04	0222	EMER INCI OF ENV CONTAM	01 02 04	0247	DNA DAM/REPAIR	01 02 04
0208	NEURO (HUMAN)	01 02 04	0223	RESPONSE REQEST DELAY	01 02 04	0248	PROD/USE/PROC	01 02 04
0209	NEURO (ANIMAL)	01 02 04	0224	PROD/COMP/CHEM ID	01 02 04	0251	MSDS	01 02 04
(0210)	ACUTE TOX. (HUMAN)	01 02 04	0225	REPORTING RATIONALE	01 02 04	0299	OTHER	01 02 04
0211	CHR. TOX. (HUMAN)	01 02 04	0226	CONFIDENTIAL	01 02 04			
[redacted]	~~ACUTE TOX. (ANIMAL)~~	~~01 02 04~~	0227	ALLERG (HUMAN)	01 02 04			
0213	SUB ACUTE TOX (ANIMAL)	01 02 04	0228	ALLERG (ANIMAL)	01 02 04			
0214	SUB CHRONIC TOX (ANIMAL)	01 02 04	0239	METAB/PHARMACO (ANIMAL)	01 02 04			
0215	CHRONIC TOX (ANIMAL)	01 02 04	0240	METAB/PHARMACO (HUMAN)	01 02 04			

TRIAGE DATA:	NON-CBI INVENTORY	ONGOING REVIEW	SPECIES	TOXICOLOGICAL CONCERN:	USE:	PRODUCTION:
	(YES)	YES (DROP/REFER)	HmN	LOW		
CAS SR	NO	NO (CONTINUE)		MED		
	DETERMINE	REFER:		HIGH		

COMMENTS:

8E Number and Chemical Name	Rank	Reason or Brief Description
-11763 Bromotrifluoro-methane, CAS 75-63-8	Low	A 1966 toxicology study of the material, then intended for use as a fire extinguishing agent, using 3 human volunteers showed various mild effects after dosing with 5 concentrations in order up to 7% in air. The chemical, known as Halon 1306, is barred from import into the United States and domestic manufacturing ceased Jan. 1994.
-12239 Butyl cellosolve, CAS 111-7-2	Low	In 1952 the chemical was tested for induction of red cell fragility in 2 human volunteers to develop a cadre of tests for evaluating the suitability of a 100 ppm ACGIH inhalation standard. Humans appeared less sensitive than rats but the experiment was inadequate to establish quantitative risk parameters. A standard was in place and adequate toxicology data appeared to exist at that time.
-12251 Maleic anhydride	Low	Based on case histories, a 1949 report identifies various acute effects in humans including an asthma-like reaction. By now (1996) the hazard is well documented and exposures are usually controlled.
-12248 Toluene diisocyanate, TDI, CAS 2647-62-5	Low	A 1964 plant industrial hygiene report related to several case histories shows the parent company was aware that TDI can induce respiratory sensitization leading to permanent industrial asthma. The adverse effects of TDI are now established.